Amendments to the Specification

Please replace paragraph [0023] at page 3 with the following amended paragraph:

[0023] Fig. 9 is a simplified diagram illustrating a sample-scan line raster pattern created by two imaging sensors oriented orthogonal to one another and the outlines of oversquare optical code labels oriented in various directions.

Please replace paragraph [0032] at page 4 with the following amended paragraph:

[0032] Another method for illuminating the optical code is by the use of a uniform light source with the reflected light detected by an array of optical detectors, such as a charge-coupled device (CCD) or CMOS image sensor. In such a technique, as with a scanning laser, an electrical signal is generated having amplitude determined by the intensity of the collected light. In either the scanning laser or imaging technique, the amplitude of the electrical signal has one level for the dark areas and a second level for the light areas. As the code is read, ~~positive and negative~~ positive-going and negative-going transitions in the electrical signal occur, signifying transitions between light and dark areas.

Please replace paragraph [0037] at page 6 with the following amended paragraph:

[0037] The DOF of an optical code reading system varies as a function of, among other variables, focal distance and aperture setting. Typically, optical code readers suffer from a shallow DOF. This shallow DOF is due to the low levels of reflected light available to read an optical code, particularly in ambient light CCD optical code readers. Since low levels of light are available, the optical code reader

system requires the use of large aperture settings. This large aperture setting in turn results in a shallow DOF. While a conventional omni-directional optical code reader may accurately read an optical code at the exact focal distance of the system, slight variations from this focal distance (i.e., outside the DOF) will result in ~~out of focus~~ out-of-focus and unsuccessful optical code reading.

Please replace paragraph [0042] at page 8 with the following amended paragraph:

[0042] Fig. 3 depicts the other out-of-focus condition, whereby the object 114 is moved to a distance D_{o3}, which is closer to lens system 112. In this case, the image plane 103 moves away from the lens 112, to a distance D_{i3}. In this case, the light from, for example, optical code object point 117a would converge to sharp focus at conjugate image point 118a except for the fact that it strikes image sensor 113 before reaching this point. As in the last case, a blur circle of diameter B_{118a} is formed on the image sensor. At some point, the blur circles formed in the cases shown in Figs. 2 and 3 grow just large enough as to make the image too defocused to be of use. It is the location of the object planes 104 in these two extreme cases that define the inner and outer limits of the depth-of-field of the system. This depth-of-field is dependent upon the f number of the system, which, for a given focal length lens, is just dependent upon the aperture stop 110. For a high f-number (small aperture) system the depth-of-field is greater than for a low f-number (large aperture) system. Unfortunately, although a large depth-of-field is desired for an optical code reading device, if the aperture is made smaller to achieve this goal, then the amount of light

falling on the sensor, and thus the brightness of the image is greatly reduced.

Please replace paragraph [0060] at page 15 with the following amended paragraph:

[0060] Fig. 7 illustrates an optical code reader 705 having two image sensor arrays 713a and 713b. Each image sensor array 713a and 713b is arranged at an angle with respect to lens system 712 in accordance with the Scheimpflug principle so that the DOF of each image sensor array 713a, 713b is improved. Additionally, each image sensor array 613a and 613b is rotated such that the raster patterns of each are orthogonal to one another. Thus, each image sensor array (713a and 713b) produces respective projected images 724a and 724b in object space. These projected images 724a and 724b represent not only the region in object space where an object ~~714~~ 114 (not visible in Fig. 7, but shown in Figs. 1-4) will produce a well-focused image, but also represent the relative orientation of an object ~~714~~ 114 marked with an optical code which may be positioned at and still be accurately read. Thus, while the actual location and position of an object ~~714~~ 114 to be read is not known, so long as object ~~714~~ 114 is located and positioned in the space designated by projected images 724a and 724b, optical code reader 705 will be able to accurately read the optical code.

Please replace paragraph [0061] at page 15 with the following amended paragraph:

[0061] Two sensors, image sensor array 713a oriented in a horizontal direction and image sensor array 713b oriented in a vertical direction, are arranged about the axis of a lens system 712. The image sensor arrays 713a and 713b are rotated

in such a way as to create projected images 724a in a horizontal orientation and projected image 724b in a vertical orientation in object space. The two sensors taken together create a sizable scan zone 721. Scan zone 721 represents the region in object space where an object ~~714~~ 114 marked with an optical code may be positioned and produce a well-focused image in image space. Thus, an object ~~714~~ 114 marked with an optical code label in a substantially vertical orientation positioned within projected image 724a will produce a well-focused, properly read image of the optical code. Alternatively, the optical code reader 705 may also provide a ~~well focused properly read~~ well-focused, properly-read image of the optical code marked on an object ~~714~~ 114 marked with an optical code label in a substantially horizontal orientation positioned within projected image 724b.

Please replace paragraph [0062] at page 16 with the following amended paragraph:

[0062] Fig. 8 shows a second possible configuration of an optical code reader 805 similar to the reader 705 shown in Fig. 7. In contrast to the first configuration, the optical code reader 805 includes a beam splitter 830, so that two projected images may overlap and create a more compact scan zone 821. In this configuration, the image of the horizontal image sensor array 813a is created by the direct optical path from the image sensor array 813a, through the partially transmissive beam splitter 830 and lens system 812 to the projected horizontal sensor image 824a. The vertically oriented image sensor array ~~824b~~ 813b produces an image from rays of light following the optical path from the image sensor array 813b that involves a reflection from the beam splitter 830, through the lens system 812, to the projected ~~image of~~

~~the~~ vertical sensor image 824b. This construction allows for a more compact scan zone 821, which is typically easier for an operator to use. Thus, an object (positioned in object space) marked with an optical code label with either a substantially vertical or horizontal orientation positioned within scan zone 821 will produce a ~~well focused fully read~~ well-focused, fully-read image of the object 814 (not shown) marked with the optical code label on the image sensors 813a, 813b in image space.

Please replace paragraph [0067] at page 17 with the following amended paragraph:

[0067] In order to allow for omni-directional reading of truncated optical codes, additional raster patterns may be added to produce more complex sample-scan patterns as shown, for example, in Fig. 10. To produce the additional raster patterns, additional image sensor arrays 113 are provided. As each image sensor array 113 is added to the optical code reader, the omni-directional reading capability also increases. To produce a sample-scan line pattern capable of omni-directional reading, N number of image sensor arrays are provided. Each of the plurality of image sensor arrays is oriented (rotationally relative to an axis of the optical path of the lens system) in a direction 180/N degrees out of phase from one another.

Please replace paragraph [0068] at page 17 with the following amended paragraph:

[0068] Fig. 11 illustrates an optical code reader 1110 with a number of photodetector sensor arrays, which may be expanded to N arrays. Fig. 11 shows a lens system 1112 that produces projected images 1124a, 1124b, and 1124c of image sensor

arrays ~~1113a, 1113b, and 1113c~~ 1104a, 1104b, and 1104c in a compact scan zone 1121. The compact scan zone 1121 may contain projected images of N-number of image sensor arrays, where N is an integer greater than 1. An object positioned within scan zone 1121 will produce a well-focused image onto the N-number of image sensor arrays ~~1113~~1104. A sample-scan line pattern is defined based on the dimensions of the optical code to be scanned. The pattern is preferably determined so that a minimum number of scan line directions are utilized to provide omni-directional optical code reading. A sample-scan line pattern capable of reading a truncated optical code label at any orientation is shown in Fig. 10.

Please insert the following new paragraph [0068a] after paragraph [0068] at page 18:

[0068a] Thus a multiple image sensor array reader may be formed with a lens system focusing an image of an object being read along an optical path; and N image sensor arrays for detecting a signal representative of light reflected from an optical code through the lens system, wherein each of the N image sensor arrays is disposed at approximately the same tilt angle α with respect to the lens system, each of N image sensor arrays being oriented in a rotational direction relative to the optical path approximately 180/N degrees to one another, N being an integer greater than 1. In the system 805 of Fig. 8, the there are two sensor arrays 813a, 813b each arranged at about the same tilt angle α to the optical path, but oriented at different rotational angles relative to the optical path. Evenly rotationally spaced, the sensor arrays 813a, 813b are rotationally oriented relative to the optical path at about 90° in relation to one another. In the system 1110 of Fig. 11 there are three sensor arrays 1104a, 1104b,

1104c each arranged at about the same tilt angle α to the optical path, but oriented at different rotational angles relative to the optical path. Evenly rotationally spaced about the optical path, the sensor arrays are rotationally oriented relative to the optical path at 60° in relation to one another.

Please replace paragraph [0069] at page 18 with the following amended paragraph:

[0069] Additionally, each of these sensors ~~1113a, 1113b, and 1113c~~ 1104a, 1104b, and 1104c includes a tilt mount setting to set each of the additional imaging sensors at an angle in accordance with the Scheimpflug principle. Such angle setting for each image sensor array provides a preferred DOF for each sensor.

Please replace paragraph [0070] at page 18 with the following amended paragraph:

[0070] By tilting an image sensor arrays ~~1113~~1104a, 1104b, 1104c in accordance with the Scheimpflug principle, the optical code reader provides a preferred DOF to read optical codes oriented in the same direction of the imaging sensor array. By rotating a single tilted image sensor array 113 in synchronicity with the timing of the raster scan, a single imaging sensor array may produce the sample-scan pattern depicted in Fig. 10. Fig. 12 illustrates an optical code reader with a rotatable sensor array.